Sialyte(TM)-Based Composite Pressure Vessels for Extreme Environments, Phase I

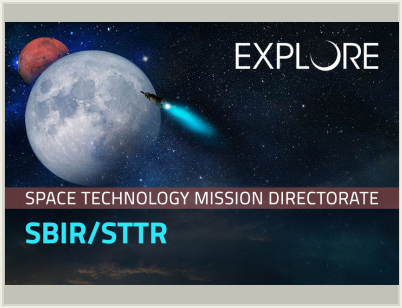
Completed Technology Project (2005 - 2005)

Project Introduction

While traveling to Venus, electronics and instruments go through enormous pressure, temperature, and atmospheric environment changes. In the past, this has caused problems with the life expectancy of electronics and instruments. Cornerstone Research Group, CRG, proposes to develop a Sialyte(TM)-based composite pressure vessel to perform in such extreme environments. Sialyte(TM) is an inorganic resin that can operate at high temperatures and pressures and can prevent buckling when used as a sandwich structure core (good compressive strengths). Sialyte(TM) has thermal properties similar to a ceramic material, yet processing characteristics like an organic polymer. Sialyte(TM) is also resistant to many chemicals. CRG previously developed this material and is currently using it for structural and protective applications. By using Sialyte(TM) in combination with Nextel(TM) ceramic fabric, CRG can fabricate a filament wound structure using conventional composite manufacturing processes that will perform in extreme environments. The use of filament winding for fabrication will allow for many possible design options in an affordable manner. A Sialyte(TM)-based composite pressure vessel tank will not only meet but exceed NASA's requirements for a pressure vessel for extreme environments.

Anticipated Benefits

This project's technologies developed for NASA systems would directly apply to systems operated by other government and commercial enterprises. Government systems that would derive the same benefits would include but not be limited to electronic or instrument housing systems for harsh environments in military operations (Department of Defense). This technology's attributes for extreme environment survivability should yield a high potential for private sector commercialization for solar system exploration as well as inspection instrument housing for the chemical manufacturing industry. Supporting NASA's Space Science Enterprise, this project's technologies directly address requirements for technologies for high temperature and high pressure environments for exploration of Venus and other planets. This project's technologies offer high temperature and high pressure capabilities using common composite fabrication processes for affordability. This project would also use X-Aerogels developed by NASA for their thermal and structural properties and provide a route to commercialization for this proven material.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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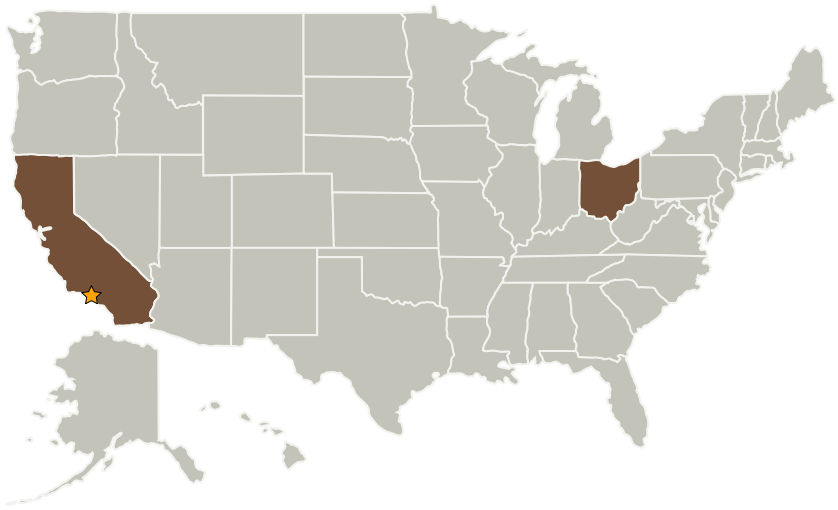
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Cornerstone Research Group, Inc.	Supporting Organization	Industry	Miamisburg, Ohio

Primary U.S. Work Locations	
California	Ohio

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Project Manager:
Celestino Jun Rosca

Principal Investigator:
Benjamin A Dietsch

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.6 Extreme Environments Related to Critical System Health Management